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CW/HW 29: Exponential Growth vs. Decay

**Honors Geometry**

SWBAT interpret the parameters of exponential decay and exponential growth functions.

SWBAT describe the characteristics that differentiate an exponential growth versus an exponential decay model.

*Today we are going to describe the characteristics that will differentiate an exponential growth versus an exponential decay model. We will do this by comparing tables and graphs of various functions and describing the behavior of each of these. We will do this so that we can create accurate descriptions for sets of data that we might find in the world, as well as for determining how to model certain situations.*

Part 1. Make a table of values to represent the functions and .

* What do you notice about the tables of the functions?
* Graph the functions from Part 1. What do you notice about the graphs of the functions?

Exponential Growth vs. Exponential Decay Functions

* What characterizes exponential growth versus exponential decay?
* What are real world models of exponential growth and decay?
* How can you differentiate between an exponential model from a linear model given a real world set of data?

1. Movie tickets now average $9.75 a ticket, but are increasing 15% per year. How much will they cost 5 years from now?
2. A powerful computer is purchased for $2000, but on the average loses 20% of its value each year. How much will it be worth 4 years from now
3. The number of bacteria present in a colony is 180 at 12 noon and the bacteria grows at a rate of 22% per hour. How many will be present at 8pm?
4. A 3 bedroom house in Nashville, TN is worth $110,000. If it appreciates in value at a rate of 2.5% per year, how many years will it take for the house to be valued at $200,000?
5. The pesticide DDT was widely used in the United States until its ban in 1972. DDT is toxic to a wide range of animals and aquatic life, and is suspected to cause cancer in humans. The half-life of DDT can be 15 or more years. Half-life is the amount of time it takes for half of the amount of a substance to decay. If you start with 100 grams of DDT that has a half-life of 15 years, how many grams of DDT will be left after 90 years?
6. Most cars decrease in value after you leave the dealer. However, some cars are now considered "classics" and actually increase in value. You have the choice of owning two cars: A 2006 Mazda Maita which is worth $19,000 but is depreciating 10% per year, or a classic 1970 Ford Mustang which is worth $11,500 and is increasing in value by 6% each year. Your tasks:
   1. Write an equation to represent the value of each car over time.
   2. Create tables and draw a graph to represent the value of each car for ten years on the same set of axes.
   3. Use your graph to determine approximately when the Mazda and the Ford have the same value.